

**EPA Superfund
Record of Decision:**

**FORT WAINWRIGHT
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FORT WAINWRIGHT, AK
07/20/1995**

RECORD OF DECISION
for
INTERIM REMEDIAL ACTION
CHEMICAL AGENT DUMP SITE
OPERABLE UNIT 1
FORT WAINWRIGHT
FAIRBANKS, ALASKA

JULY 1995

DECLARATION STATEMENT

RECORD OF DECISION INTERIM REMEDIAL ACTION CHEMICAL AGENT DUMP SITE OPERABLE UNIT 1 FORT WAINWRIGHT FAIRBANKS, ALASKA JULY 1995

SOURCE AREA NAME AND LOCATION

U.S. Army Alaska, Fort Wainwright
Fairbanks-North Star Borough
Fairbanks, Alaska

Source Area in Operable Unit 1
Chemical Agent Dump Site

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the Chemical Agent Dump Site (previously known as the Chemical Warfare Disposal Area) on Fort Wainwright, a National Priorities List site located near Fairbanks, Alaska. The interim remedy was chosen in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. The decision is based on the administrative record for this source area and is summarized in the attached Decision Summary.

The United States Army is the lead agency for this decision. The United States Environmental Protection Agency and the Alaska Department of Environmental Conservation participated in the scoping of site investigations and evaluations of the interim remedial action alternatives and concur with the remedy.

ASSESSMENT OF THE SITE

Actual or potential releases of hazardous substances from the Chemical Agent Dump Site, if not addressed by implementing the interim remedial action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, public welfare, and the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected interim remedial action addresses contamination at one source area (the Chemical Agent Dump Site) in Operable Unit 1, one of five operable units at Fort Wainwright. The purpose of this interim remedial action is to reduce risks posed by the potential presence of soil containing chemical agent breakdown products, debris, and chemical warfare materials. Chemical warfare materials consist of glass vials or other containers that may still contain chemical agents. Chemical warfare materials, if present, would pose a threat to human health and the environment at this location.

This interim remedial action will also reduce the potential for contamination of groundwater, thus eliminating a pathway of contaminant migration to humans, wildlife, and plants. The selected interim remedial action is expected to be consistent with the final remedy that will be selected following completion of the Remedial Investigation/Feasibility Study for Operable Unit 1.

The major components of the selected remedy include:

- Excavation of the Chemical Agent Dump Site to a maximum depth of approximately 15 feet, or when bedrock is encountered;
- Field screening of excavated material for soil containing chemical agent breakdown products, debris, and glass vials or other containers that may still contain chemical warfare materials;
- Storage of all excavated chemical warfare materials in a secured interim holding facility at Fort Wainwright until final disposition by treatment or disposal; and

- A chemical neutralization process and containerization of soil containing chemical agent breakdown products and debris for off-site disposal at an out-of-state, licensed disposal facility.

DECLARATION

The selected interim remedial action is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. It is anticipated that this action will be the final action required for removing potential contamination from this source area, unless groundwater contamination is identified. If groundwater contamination is identified, the data will be immediately evaluated and appropriate response actions will take place. This action will be addressed in the Record of Decision for Operable Unit 1. This remedy utilizes permanent solutions for potential soil contamination and alternate treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatments that reduce toxicity, mobility, or volume as a principal element. Because this remedy will not result in hazardous substances remaining at this source above health-based levels, the five-year review will not apply to this action.

SIGNATURES

Signature sheet for the foregoing Operable Unit 1, Chemical Agent Dump Site, Fort Wainwright Interim Remedial Action, Record of Decision between the United States Army and the United States Environmental Protection Agency, Region X, with concurrence by the Alaska Department of Environmental Conservation.

Raymond J. Fatz

Date

Acting Deputy Assistant Secretary of the Army
Environmental Safety and Occupational Health
United States Army

Signature sheet for the foregoing Operable Unit 1, Chemical Agent Dump Site, Fort Wainwright Interim Remedial Action, Record of Decision between the United States Army and the United States Environmental Protection Agency, Region X, with concurrence by the Alaska Department of Environmental Conservation.

Chuck Clarke

Date

Regional Administrator, Region X
United States Environmental Protection Agency

Signature sheet for the foregoing Operable Unit 1, Chemical Agent Dump site, Fort Wainwright Interim Remedial Action, Record of Decision between the United States Army and the United States Environmental Protection Agency, Region X, with concurrence by the Alaska Department of Environmental Conservation.

Kurt Fredriksson

Date

Director, Spill Prevention and Response
Alaska Department of Environmental Conservation

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ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ARARs	Applicable or Relevant and Appropriate Requirements
Army	United States Army
BGS	below ground surface
CAIS	Chemical Agent Identification Sets
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CWM	Chemical warfare materials
CFR	Code of Federal Regulations
°C	Degrees celsius
EPA	United States Environmental Protection Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
GPR	ground-penetrating radar
IHF	Interim holding facility
IRA	Interim remedial action
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OU-1	Operable Unit 1
OU	Operable unit
PSE	Preliminary Source Evaluation
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
TBC	To-be-considered

DECISION SUMMARY

RECORD OF DECISION INTERIM REMEDIAL ACTION CHEMICAL AGENT DUMP SITE OPERABLE UNIT 1 FORT WAINWRIGHT FAIRBANKS, ALASKA JULY 1995

This Record of Decision (ROD) provides an overview of the problems posed by the potential contamination at the Chemical Agent Dump Site, a source area placed within Fort Wainwright's Operable Unit 1 (OU-1). It describes the physical features of the source area, the history of source area investigations, and the rationale for conducting an interim remedial action (IRA) at the source area. In addition, the decision summary describes the remedial alternatives considered, provides the rationale for the remedial action selected, and states how the remedial action will satisfy the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) statutory requirements.

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Fort Wainwright, also referred to as "the site," is located on the eastern edge of the City of Fairbanks in the Fairbanks-North Star Borough in interior Alaska (Figure 1). Primary missions at Fort Wainwright include the training of infantry soldiers in the arctic environment, testing of equipment in arctic conditions, preparation of troops for defense of the Pacific Rim, and rapid deployment of troops worldwide. On-site industrial activities include fixed-wing aircraft, helicopter, and support vehicle maintenance. The 918,000-acre site includes the main post area, a range complex, and two maneuver areas.

Fort Wainwright was originally established as a cold-weather testing station in 1938. Renamed Ladd Army Airfield in 1939, the site next served as a resupply point for remote field stations and a crew transfer point in the Lend-Lease Program through which military aircraft and other supplies were ferried to the Soviet Union during World War II. In 1947, the site was redesignated as Ladd Air Force Base and began serving as a resupply and maintenance base for remote distance early warning sites and experimental stations in the Arctic Ocean. The site was renamed Fort Wainwright on January 1, 1961, and all of its operations were transferred to the United States Army (Army).

The Chemical Agent Dump Site, also referred to as the "source area," is a fenced area covering approximately 3,200 square feet at the base of Birch Hill, north of the main post area and east of the Fairbanks Fuel Terminal. The source area is bounded by a bedrock outcrop to the north and Birch Hill Road and the Fairbanks-Eielson Pipeline to the south (Figure 2). Land uses immediately adjacent to the Chemical Agent Dump Site include military training and recreational uses.

1.1 Site Demographic Characteristics

The Fairbanks-North Star Borough has a population of 77,720. The City of Fairbanks is relatively densely populated, but is surrounded by vast, uninhabited areas. The town of North Pole, located to the southeast, has a population of 1,456. Of the 6,657 people working at Fort Wainwright, 5,085 are soldiers, 701 are Army civilians, and 871 are other civilians. Approximately 11,775 people live on the base itself.

The Fairbanks residential subdivision closest to the Chemical Agent Dump Site, Shannon Park, is located approximately 0.75 mile southwest of the source area. The 801 Housing Subdivision, an on-post housing area also known as Birchwood, is located 1 mile south of the source area and houses approximately 1,580 people. The North Post Housing Subdivision (another on-post housing area) is located about 1.25 miles to the southeast and is home to a total of 698 people.

There are two main schools in the area. Ladd Elementary School is located approximately 0.85 mile south of the source area and serves approximately 675 students. Tanana Junior High School is located approximately 0.9 mile south of the source area and serves 625 Students. School is usually in session from the end of August through the end of May.

2.0 SOURCE AREA HISTORY AND ENFORCEMENT ACTIVITY

2.1 History of Operations

In 1946 or 1947, 20 to 30 cylinders of mustard agent were reportedly buried in a trench at this source area. Long-time residents, former military personnel, and retired civilian workers reported that the trench was posted as "Poison Gas" or "Gas."

Army records indicate that a removal action took place in 1966 at the Chemical Agent Dump Site. A former soldier who operated the backhoe during the 1966 removal activity was interviewed in 1987. The former soldier stated that seven cylinders (approximately 2 to 3 feet long) and an unknown number of wooden crates with glass vials were removed during the 1966 excavation. The cylinders and wooden crates were buried to a depth of approximately 8 feet in the trench.

In a subsequent interview, the glass vials were identified as belonging to Chemical Agent Identification Sets (CAIS). The Army used CAIS during World War II to train military personnel in identification of chemical agents by odor and other immediate effects. The identification sets consisted of small glass tubes of various chemical agents. The tubes were packed in cardboard or other packing materials inside metal cans; the metal cans were overpacked into wooden crates.

2.2 History of Source Area Investigations

A Records Search to gather existing information to identify physical locations and potential hazards at various potential source areas throughout Fort Wainwright was completed on February 12, 1992. The Records Search scope of work included the collection and review of records pertaining to the entire Fort Wainwright site (including aerial photographs, geological surveys, and hydrological and topographical maps) and interviews with personnel associated with current and past operations.

In order to determine the source area location, aerial photographs taken between 1948 and 1990 were subsequently reviewed. Other interviews conducted with local residents and former employees confirmed what was known about historical activities at the source area. The physical location of the source area was identified by the former soldier who operated the backhoe during the 1966 removal activity.

A Preliminary Source Evaluation (PSE) was conducted at the source area in summer 1993. During the evaluation, 12 soil borings were drilled and four of the borings were completed as groundwater monitoring wells. Surface soils were field screened for evidence of mustard agent, lewisite, phosgene, and chloropicrin-the compounds believed to most likely be present at the source area. Subsurface soils and groundwater were also analyzed for chemical agents and their breakdown products. The PSE results indicated that chemical agents and their breakdown products were not present in the soil and groundwater sampled.

Based on the former soldier's account of the excavation, geophysical surveys (using nonintrusive subsurface investigative techniques) were conducted from 1987 through 1993. In July 1992, ground-penetrating radar (GPR) was used to delineate the source area and a magnetometer was used to scan the area for ferrous metal objects. GPR, cross-borehole tomography, and electro-magnetic resonance imaging surveys were conducted in 1993. The surveys were conducted by government contractors and Cold Regions Research Engineering Laboratory personnel to confirm the absence of metal containers.

The GPR and the cross-bore hole tomography surveys indicated two areas of disturbed ground at a depth of 10 to 13 feet above a bedrock horizon. These areas of disturbed ground are the suspected burial locations of chemical agents. Investigative efforts to date have been unable to confirm whether soil containing chemical agent breakdown products, debris, or chemical warfare materials (CWM) are still buried at the source area. (CWM consist of glass vials or other containers that may still contain chemical agents.) Based on the results of the geophysical investigations, there is a high level of confidence that no metallic cylinders remain at the source area. The only way the presence or absence of CWM in nonmetallic containers can be confirmed, however, is through excavation of the source area.

Figure 3 illustrates the Chemical Agent Dump Site, including the base of Birch Hill, the fence, the location of the groundwater monitoring wells, the locations of subsurface soil disturbances detected by the geophysical investigations, and the approximate location of the Fairbanks-Eielson Pipeline.

2.3 History of Enforcement Actions

Fort Wainwright was placed on the CERCLA National Priorities List in August 1990. The United States Environmental Protection Agency (EPA), the United States Department of Defense, and the State of Alaska signed a Federal Facility Agreement (FFA) in March 1992. The FFA was designed to guide investigations and response actions for hazardous substance/waste releases at the entire site, facilitate cooperation and information exchange among the three agencies, and establish requirements for the performance of investigations and response actions. Source areas, grouped into five operable units (Ous), were identified

in the FFA for inclusion in the environmental investigation and cleanup process for Fort Wainwright. (In the FFA, the Chemical Agent Dump Site was referred to as the Chemical Warfare Disposal Area.) The Chemical Agent Dump Site is one of five source areas currently being addressed in the OU-1 Remedial Investigation (RI). There are no enforcement actions associated with this source area.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community relations activities, aimed at increasing public awareness and involvement, have been ongoing at Fort Wainwright for several years. In addition to a postwide Community Relations Plan, OU-specific community relations plans have been developed to address OU and source area concerns.

The public was encouraged to participate in the selection of the remedy for the Chemical Agent Dump Site during a public comment period from April 19 to May 19, 1995. The Fort Wainwright Proposed Plan for Interim Remedial Action at the Operable Unit 1 Chemical Agent Dump Site presented alternatives being considered by the Army, EPA, and Alaska Department of Environmental Conservation (ADEC) for the source area. The Proposed Plan was released to the public on April 19, 1995, and copies were sent to all known interested parties including approximately 150 elected officials and concerned citizens. An informational Fact Sheet dated March 1995, providing information about the Army's entire cleanup program at Fort Wainwright, was mailed to the individuals and organizations on the mailing list.

The Proposed Plan summarized available information about the source area. Additional materials were placed in two information repositories located at the Noel Wien Library in Fairbanks and the Fort Wainwright Post Library. An Administrative Record, comprising all items placed in the information repositories and other documents used in the selection of the IRA, was established in Building 3023 at Fort Wainwright. Members of the public were invited to inspect materials available in the Administrative Record and the information repositories during business hours.

Interested citizens were invited to comment on the Proposed Plan and the remedy selection process in writing by mailing comments to the Fort Wainwright Project Manager, calling a toll-free telephone number to record a comment, or commenting in person at a public meeting on April 25, 1995, in Fairbanks at the Fort Wainwright Library. One organization submitted comments in writing, no comments were recorded off the toll-free line, and one person provided oral comments at the public meeting. A total of 24 people attended the public meeting, which also included presentations on the IRA and the Proposed Plan for OU 3 and an opportunity to ask questions about both documents.

Display advertisements in the Fairbanks Daily News-Miner, published on April 12, 16, 19, 23, 24, and 25, 1995, also included information about the information repositories, the toll-free telephone line, and the address for submitting written comments.

The Responsiveness Summary, found in Appendix A to this document, addresses the comments received from the public on the Proposed Plan and the remedy selection process. This decision document summarizes comments received from the public during the comment period and provides official responses to those comments. The public was supportive of this IRA although concerns were raised about potential risks during excavation and storage. The selection of the IRA was based on the Administrative Record for this source area.

4.0 SCOPE AND ROLE OF OPERABLE UNIT AND RESPONSE ACTION

OU-1, which contains the Chemical Agent Dump Site, is one of five OUs comprising known and suspected source areas at Fort Wainwright. Existing site characterization data indicate that this source area may pose a threat to human health and the environment if glass vials or other containers containing CWM remain at the source area. This ROD addresses the first IRA to be conducted at Fort Wainwright.

RI fieldwork to determine the nature and extent of contamination at the remaining source areas in OU-1 and to obtain information needed to identify cleanup alternatives is scheduled to begin in 1995. The Feasibility Study (FS), which will begin following completion of the RI, is scheduled to conclude by August 1996. The FS will establish criteria for the cleanup and identify and evaluate cleanup alternatives for the OU. Final cleanup for OU-1 is not scheduled to begin until after completion of the entire RI/FS and publication of the ROD in 1997.

Because it is believed that every other available investigative technique has already been used at the Chemical Agent Dump Site, excavation is the only method remaining to determine the presence of soil containing chemical agent breakdown products, debris, and CWM. If CWM remain at the source area, the Army, EPA, and ADEC are concerned that future releases of CWM could occur if containers were to become damaged. The Army, EPA, and ADEC chose the excavation IRA as a precautionary measure to prevent possible future releases. The selected IRA will allow a response to occur in 1995, sooner than it could otherwise take place in the RI/FS process.

The selected IRA will prevent possible exposures to CWM and associated risks to human health and the environment. Excavation and secure storage will eliminate the chance for exposure and off-site migration of contaminants. The potential for a release to occur during excavation activities has been considered, and appropriate standards for protection will be in place. Although CWM and their breakdown products were not detected during the field investigation, glass vials or other containers of CWM may still remain buried at the source area.

If this IRA is not undertaken, and a CWM release occurs at this source area, contaminants may migrate into soils, bedrock/schist (fractured bedrock), and groundwater. The selected IRA is expected to be a final action for the Chemical Agent Dump Site unless groundwater contamination is discovered. If groundwater contamination is identified, the data will be immediately evaluated and appropriate response actions will occur. These actions will be addressed in the ROD for OU-1. It is expected that the selected IRA will be consistent with any planned future actions that will take place as a result of the RI/FS process and the subsequent ROD for OU-1.

5.0 SUMMARY OF SOURCE AREA CHARACTERISTICS

5.1 Geology and Hydrology

Most of Fort Wainwright, including the main post area, lies within the lowlands of the Tanana River Basin. The surficial layer (generally less than 5 feet thick) comprises fine-grained soil overlying deeper alluvial floodplain deposits. The alluvial deposits beneath the surficial soil consist of layers of silt, sand, and gravel. Subsurface materials at the base of Birch Hill consist of variable thicknesses of Fairbanks loess and Chena alluvium that overlie the Birch Creek schist. At the base of Birch Hill, from the source area west to the Fairbanks Fuel Terminal, subsurface explorations have encountered Fairbanks loess overlying Chena alluvium at depths from 3 to 30 feet below ground surface (BGS). Weathered Birch Creek schist (fractured bedrock) is encountered at depths from 8 to 10 feet BGS at this source area. The depth to the alluvium-bedrock contact is believed to increase with distance from the base of Birch Hill, but this contact may be undulating.

The main aquifer in the Fort Wainwright area is the Tanana basin alluvium. The aquifer ranges from a few feet thick at the base of Birch Hill to at least 300 feet thick under the main post area. The aquifer is considered to be unconfined in areas free of permafrost. The water table is generally encountered within 10 to 20 feet BGS and is generally believed to flow west-northwest, similar to the flow direction of the Chena and Tanana rivers. Groundwater is encountered at approximately 9 to 10 feet BGS at the base of Birch Hill and is generally reported to flow west-southwest at the Chemical Agent Dump Site. The hydraulic gradient across the post on the south side of the Chena River ranges from about 0.0015 to 0.0005 during periods of normal summer flow. Hydraulic conductivity is commonly on the order of 1×10^{-1} centimeters per second or more. No permafrost was encountered during investigations at the source area.

The Chena River flows from its headwaters through Fort Wainwright for approximately 2 miles to confluence with the Tanana River. There are no surface water bodies or drainage ditches at the Chemical Agent Dump Site. The nearest surface water bodies are shallow ponds located approximately 40 feet south of the fence line. Many areas on and near Fort Wainwright are covered by muskeg and wetlands. The source area is located within a white spruce quaking aspen forest. However, a black spruce forested wetland is located less than 600 feet south of the source area. The Chena River is approximately 1.1 mile south of the Chemical Agent Dump Site. The source is not located within the 100-year floodplain.

5.2 Sources and Types of Contaminants

The CWM that are potentially still buried at the Chemical Agent Dump Site present both human health and environmental concerns. CWM are compounds used in military operations to kill, seriously injure, or incapacitate humans as a result of exposure. The four chemical agents most likely buried at the source area and a summary of the physical and chemical properties of each are listed below.

Mustard. Mustard is a blister agent used primarily for casualty effects. It acts as a cell irritant 4 to 6 hours after initial exposure and eventually progresses to a cell poison on all contaminated tissue surfaces. It has a distinctive garlic-like odor and remains effective for a relatively long period of time under normal weather conditions. Distilled mustard is a related agent that has been purified through washing and vacuum distillation. Distilled mustard has less-pronounced odor, greater blistering power, and more stability in storage. Mustard has a liquid density of 1.2685 at 25°C (degrees Celsius), a vapor density of 5.4, and a freezing point of 11.45°C, well above the source area's average groundwater temperature of 4°C. Mustard is expected to be a solid in soil temperatures found at this source area. Mustard hydrolyzes slowly in water into thiodiglycol, hydrochloric acid, sulfonium salts, and hydrogen chloride.

Lewisite. Lewisite is a blister agent similar to mustard, but uses arsenic as the central atom. It has about the same blistering action on the skin as distilled mustard, but the lethal dosage for lewisite is much higher. Exposure to this compound produces immediate physical discomfort and a reddening of the skin within 30 minutes of the initial exposure. Blistering occurs approximately 13 hours after initial exposure. Permanent blindness occurs within 1 minute of initial exposure if the eyes are not decontaminated with large amounts of water. Lewisite is a liquid with an odor similar to geraniol. Lewisite has a liquid density of 1.89 at 20°C, a vapor density of 7.1, and a freezing point of -18 to 0.1 °C (depending on purity and the presence of isomers). Lewisite is expected to be a liquid because of the temperatures found on site. Lewisite hydrolyzes very rapidly when in the presence of high humidity or water. The products of hydrolysis are hydrochloric acid and chlorovinyl arsenous oxide.

Chloropicrin. Chloropicrin is a severe mucous membrane irritant and mild vomiting agent. It is most effective when dispersed as a vapor. It causes immediate burning, pain, and tearing of the eyes, even in very low concentrations. In high concentrations, this chemical agent causes severe damage to lungs, resulting in pulmonary edema. As a liquid, chloropicrin causes severe burns that usually result in blisters and lesions. It has an intense stinging and pungent odor. Chloropicrin has a liquid density of 1.6558 at 20°C, a vapor density of 5.7, and a freezing point of -69.2°C. Chloropicrin is expected to be liquid because of the temperatures found on site. This compound decomposes into chlorine gas and nitrogen oxide near open fires, producing toxic fumes. Chloropicrin does not hydrolyze in water, but could move with groundwater in its pure state. It does, however, decompose under the influence of light. It also readily breaks down in the presence of organic solvents, lipids, organophosphorus compounds, mustards, phosgene, diphosgene, and chlorides.

Phosgene. Phosgene is a very effective, delayed-casualty, choking agent. It produces inflammatory effects on the eyes, nose, upper airways, and lungs with exposures to as little as 1 to 2 parts per million in air. Depending on exposure levels, symptoms can start as early as 10 minutes (in high concentrations, which usually result in death within 24 hours) to as long as 3 hours or more after initial exposure (low concentrations usually result in irritation of the eyes and respiratory system). Early symptoms are usually mild but gradually develop into a severe cough and shortness of breath, followed by the lungs filling with fluid, which results in "dryland drownings." Phosgene is a volatile, colorless gas with an odor similar to newly mown hay, grass, or green corn. Phosgene has a vapor density of 3.4; it thus tends to linger in low places and readily condenses to a colorless liquid below 7.8°C. It reacts rapidly with water, so rain, fog, and dense vegetation reduce its concentration in air. Phosgene hydrolyzes into hydrochloric acid and carbon dioxide. This material is mixable in most organic solvents.

If a contaminant release occurs, contaminant migration via groundwater will depend on several factors. Mustard, lewisite, and chloropicrin have low solubilities; have liquid densities greater than 1.0; and, in pure product form, may behave as dense, nonaqueous phase liquids. A mustard agent release would congeal as it approached groundwater, minimizing the potential for migration through the silty, sandy gravel soil prevalent at the source area. A release of lewisite or chloropicrin might migrate vertically and horizontally through saturated soil. Lewisite would break down and migrate readily as it mixed with groundwater; chloropicrin would simply migrate with the water. A release of phosgene would most likely not be detectable because of its rapid decomposition in the environment. Mustard, lewisite, and chloropicrin by-products and/or dissolved fractions caused by the mixing of solvents with the disposed CWM (a common practice at the time of disposal) may migrate from the source area via the groundwater pathway. Although numerical exposure values do not exist for CWM, they are highly toxic by design and any ingestion of or exposure to contaminated groundwater would pose an unacceptable risk.

6.0 SUMMARY OF SOURCE AREA RISKS

A removal action took place in 1966 at this source area. Although records are incomplete, only a portion of the reported CWM believed to be buried at this location was removed. A complete assessment of potential human health and ecological risks was not performed for the Chemical Agent Dump Site before the decision to conduct an IRA was made. Glass vials or other containers containing CWM may still remain at the source area, however, and the potential exists for future releases to soil and groundwater if CWM are still present.

A preliminary evaluation of potential contaminant migration to the air, groundwater, and surface water at the source area has been conducted to determine possible migration routes should a release occur. Because of the chemical and physical properties of the suspected CWM, contamination would likely be found in subsurface soils at a depth of approximately 8 feet BGS or more if a release were to occur. Migration to the surface through the soil column is considered to be extremely unlikely. If subsurface soils were to become contaminated, CWM and their breakdown products may migrate into groundwater, posing a risk to groundwater users. If this were to occur, the groundwater would likely be the primary potential migration pathway.

Because of the ongoing threat of a future release and toxicity of the suspected contaminants, this interim action is necessary to stabilize the source area and prevent degradation to groundwater.

7.0 DESCRIPTION OF ALTERNATIVES

The Army, EPA, and ADEC evaluated the following IRAs for the Chemical Agent Dump Site:

- Alternative 1-No Action;
- Alternative 2-Long-Term Groundwater Monitoring and Institutional Controls;
- Alternative 3-Soil Excavation with Removal of Chemical Warfare Materials, if Found.

The no-action alternative was evaluated consistent with National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requirements and served mainly as a point of comparison with the other two alternatives. The two other alternatives were selected for more detailed evaluation because they could be readily implemented using commonly available technologies and equipment.

A 20-year duration for IRA activities was selected for cost comparison purposes. In the absence of an excavation/removal action, there is no known or estimated date when monitoring would cease at the source area. The costs presented are projected costs; actual costs will vary based on the final design and detailed cost itemizations. Costs shown include capital costs and annual operation and maintenance costs (including costs associated with monitoring, maintaining, and repairing the installed system).

The main Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBC) guidance that will be triggered by action at this source area include Army Toxic Chemical Agent Safety Program. Alaska Water Quality Standards, and Resource Conservation and Recovery Act (RCRA) to determine whether the materials are hazardous wastes for storage requirements.

7.1 Alternative 1-No Action

The no-action alternative serves as a baseline for comparison with the other two alternatives. Under this alternative, no IRA would be implemented at the Chemical Agent Dump Site. If CWM or their breakdown products exist at the source area, they would remain in place. A final decision about the source area would be made in the ROD for OU-1.

No known costs are associated with Alternative 1 for either capital construction or operation and maintenance.

7.2 Alternative 2-Long-Term Groundwater Monitoring and Institutional Controls

Alternative 2 involves the installation of two new groundwater monitoring wells and semi-annual sampling of existing and newly installed groundwater monitoring wells to conduct long-term (for 20 years) groundwater monitoring and develop groundwater flow direction data. Groundwater samples would be analyzed for all potential CWM and their breakdown products to determine whether groundwater contamination is present. The detection of groundwater contamination would indicate whether CWM or their breakdown products have leaked into subsurface soils and migrated into the groundwater. If groundwater contamination is detected, an immediate evaluation of data would be conducted and an appropriate response action would take place. Costs associated with any needed response action were not included in cost estimates for this alternative.

If CWM or their breakdown products exist at the source area, they would remain in place. Final decisions about the source area would be made in the ROD for OU-1.

The costs associated with Alternative 2 would include installation of two additional groundwater monitoring wells, semi-annual sampling of new and existing groundwater monitoring wells, and laboratory analysis of samples. Capital costs are estimated to be \$75,000, and annual operation and maintenance costs are estimated to be \$35,750 for a total of \$715,000. Total costs for Alternative 2 would therefore be approximately \$790,000 over the 20-year time frame. The inflation rate and the discount rate are assumed to counterbalance. The cost accuracy percentage was calculated to be approximately -20% to +40%.

7.3 Alternative 3-Soil Excavation with Removal of Chemical Warfare Materials, if Found

Alternative 3 involves excavation of the entire source area and removal of soil containing chemical agent breakdown products, debris (e.g., small pieces of glass and wood), and glass vials or other containers that may still contain CWM. Soils will be excavated to a point where no CWM or by-products are detected. Field tests and quick-turnaround laboratory analysis will provide data to ensure that all contaminated soils are excavated during this time period.

Excavated soils containing chemical agent breakdown products and debris will be neutralized (by mixing a

decontamination agent or solution, such as bleach, with the contaminated soil), containerized, and disposed of in an out-of-state, licensed disposal facility, if required. All excavated CWM will be identified and packaged in state-of-the-art storage and transportation containers. The containers will then be transported, via truck, to a secured, interim holding facility (IHF) at Fort Wainwright until a successful method for destroying or neutralizing chemical agents is developed and final disposition by treatment or disposal is achieved.

The work plan for Alternative 3 will include measures necessary to ensure that no CWM are released to the air during excavation, neutralization, and transportation. A comprehensive health and safety plan has been developed and will be approved before the onset of any fieldwork at the source area. The health and safety plan addresses potential releases and threats to workers and nearby populations and emphasizes protection of human health and the environment. Excavation at the source area will take approximately 2 weeks. The goal is to complete excavation before the fall session starts at nearby elementary and junior high schools.

Unlike Alternatives 1 and 2, it is believed that the IRA under Alternative 3 will constitute a final remedy for the Chemical Agent Dump Site. The source area will, however, be included in the ROD for OU-1.

The costs for Alternative 3 include development of the work plan and a health and safety plan, excavation of soils, neutralization of contaminated soil, and laboratory analysis of soil samples. Because the technology to destroy or neutralize chemical agents is still being developed, costs associated with the technology that may eventually be selected could not be estimated. Because Alternative 3 will be a relatively short-term response action, the only costs will be capital costs. The total cost for Alternative 3 is estimated to be \$1 million.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP identifies nine criteria to be used to evaluate remedial alternatives. These criteria are described below as they apply to an interim action. The first two criteria, the "threshold criteria," must be satisfied in order for an alternative to be eligible for selection. The next five criteria, the "primary balancing criteria," are used to weigh major tradeoffs among alternatives that meet the threshold criteria. The last two criteria, "state acceptance" and "community acceptance," are referred to as "modifying criteria." State acceptance reflects the State of Alaska's position on how acceptable each alternative is. Community acceptance is taken into account after public comment is received on the Proposed Plan.

The three IRA alternatives were evaluated against the nine criteria to select the preferred remedy. Table 1 provides definitions for each of the nine criteria. Table 2, presented following discussion of the nine criteria, summarizes information about the evaluation of each alternative relative to the nine criteria.

8.1 Criterion 1-Overall Protection of Human Health and the Environment

The first threshold criterion, Overall Protection of Human Health and the Environment, addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled.

Based on the PSE, no contamination has been detected in subsurface soil or groundwater at the Chemical Agent Dump Site. Risks to possible future groundwater users may occur if CWM and their breakdown products potentially still buried at the source area leak into subsurface soils and migrate to groundwater.

Under Alternatives 1 and 2, soil containing chemical agent breakdown products, debris, and containers that may still contain CWM would be left in place. If a release were to occur, subsurface soils and groundwater could therefore become contaminated. Under Alternative 1, contamination would remain undetected. Under Alternative 2, potential groundwater contamination would be detected during the groundwater monitoring process. Alternative 2 provides no mechanism for determining the presence of subsurface soil contamination before contaminant migration into the groundwater, however. As a result, soil contamination would remain undetected until or unless contaminants have migrated through soil into the groundwater under Alternative 2.

In contrast, Alternative 3 will protect human health and the environment. By removing soil containing chemical agent breakdown products, debris, and any other containers that may still contain CWM, potential leakage of contaminants into subsurface soils and groundwater will no longer be possible. Short-term effects are expected to be minimal because of the safety precautions implemented during excavation to prevent and control potential releases during field activities.

Table 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY'S
NINE EVALUATION CRITERIA

Overall Protection of Human Health and the Environment

Addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements

Addresses whether a remedy will meet all the ARARs of other federal and state environmental laws, or justifies a waiver.

Long-Term Effectiveness and Permanence

Refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals are met.

Reduction of Toxicity, Mobility, and Volume through Treatment

Focuses on the anticipated performance of the treatment technologies that may be used as a cleanup alternative.

Short-Term Effectiveness

Refers to the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

Implementability

Addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a specific solution.

Cost

Includes estimated capital and operations and maintenance costs.

State Acceptance

Considers whether the state, based on its review of the remedial investigation/feasibility study (RI/FS) and Proposed Plan, concurs, opposes, or has no comment on the preferred alternative.

Community Acceptance

Considers all comments received from the public during the 30-day comment period on the RI/FS and Proposed Plan.

Table 2
COMPARISON OF ALTERNATIVES
CHEMICAL AGENT DUMP SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

CRITERION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
THRESHOLD CRITERIA			
1. Overall Protection of Human Health and the Environment	Would not offer protection as soil and groundwater contamination would not be detected	While allows for detection of groundwater contamination during monitoring, would offer no protection from groundwater or soil contamination	Will protect because of removal of soil with chemical agent breakdown products, debris, and containers still containing chemical warfare materials
2. Compliance with Applicable or Relevant and Appropriate Requirements	Would not comply if soil contains chemical agent breakdown products, debris, and/or chemical warfare materials	Would not comply if soil contains chemical agent breakdown products, debris, and/or chemical warfare materials	Will comply
PRIMARY BALANCING CRITERIA			
3. Long-Term Effectiveness and Permanence	Would not have long-term effectiveness	Would not have long-term effectiveness	Will be effective in the long term
4. Reduction of Toxicity, Mobility, and Volume through Treatment	Would not include treatment and would not reduce toxicity, mobility, or volume	not include treatment and would not reduce toxicity, mobility, or volume	No treatment, but will reduce mobility and volume (no reduction in toxicity)
5. Short-Term	No, but would cause no harm	No, but would cause no harm	Could result in release of chemical agent to environment or exposure to on-site personnel
6. Implementability	Yes, immediately implement able	Yes, immediately implement able	Yes, will take one month to implement contract
7. Cost	No cost	\$790,000 over 20 years	\$1,000,000
MODIFYING CRITERIA			
8. State Acceptance	No	No	Yes
9. Community Acceptance	No	No	Yes

8.2 Criterion 2-Compliance with Applicable or Relevant and Appropriate Requirements

The second threshold criterion. Compliance with ARARs, addresses whether a remedy will meet federal and state ARARs and/or justify a waiver. Compliance with ARARs requires evaluation of the remedial alternatives for compliance with chemical, location, and action-specific ARARs, or justification for a waiver.

The main ARARs that will be triggered by action at this source area include Army Toxic Chemical Agent Safety Program. Alaska Water Quality Standards, and Resource Conservation and Recovery Act (RCRA) to determine whether the materials are hazardous wastes for storage requirements.

Under Alternative 1, possible CWM and breakdown products would be undetected and left in place until completion of the ROD for OU-1. As a result, no compliance with ARARs would be possible.

Under Alternative 2, no CWM or their breakdown products would be removed. If a release were to occur, this alternative would not comply with soil or groundwater ARARs.

Under Alternative 3, soil containing chemical agent breakdown products, debris, and intact containers that may still contain CWM will be removed and transported to appropriate facilities. Soils will be excavated to a point where no CWM are detected. Intact glass vials and other containers that may still contain chemical agents will be held in a secured IHF at Fort Wainwright until final disposition by treatment or disposal. Soils with chemical agent breakdown products and debris will be neutralized, containerized, and transported to an out-of-state, licensed disposal facility.

Under Alternative 3, all ARARs will be met.

8.3 Criterion 3-Long-Term Effectiveness and Permanence

Long-Term Effectiveness and Permanence is the first of the primary balancing criteria. This criterion refers to expected residual risk and a remedy's ability to maintain reliable protection of human health and the environment over time, after cleanup goals have been met.

Under Alternative 1, no action would be taken. As a result, the alternative would have no long-term effectiveness and permanence. Similarly, because Alternative 2 is only a method of detecting contamination, it also would have no long-term effectiveness or permanence as a remedial action.

Under Alternative 3, the excavation/removal option, has long-term effectiveness and permanence because potential sources of contamination will be removed.

8.4 Criterion 4-Reduction of Toxicity, Mobility, and Volume through Treatment

The second primary balancing criterion, Reduction of Toxicity, Mobility, or Volume through Treatment, focuses on the anticipated performance of the treatment technologies that may be used as a cleanup alternative.

Alternatives 1 and 2 would neither treat contaminants nor reduce toxicity. In addition, neither Alternative 1 or 2 would have any impact on contaminant mobility or volume if CWM or their breakdown products still exist at the source area.

Alternative 3 will reduce the volume of contaminants and thus contaminant mobility by removing the contaminants from the source area. If soils with chemical agent breakdown products or debris are detected, the soil and debris will be treated via neutralization, containerized, and shipped off site for disposal in an out-of-state, licensed disposal facility. Treatment of the CWM still intact in containers will not take place until suitable technologies are identified.

8.5 Criterion 5-Short-Term Effectiveness

Short-Term Effectiveness addresses the period of time needed to achieve protection from any adverse impacts on human health and the environment that may be posed during the construction and implementation periods, until cleanup goals are achieved.

Alternatives 1 and 2 would pose no short-term risks, unless a release were to occur from the source area. The groundwater monitoring wells that would be installed under Alternative 2 would be located in areas where no subsurface soil disturbances have been detected, so installation would not be expected to cause any contaminant releases.

Alternative 3 is designed to excavate the entire source area and remove any contamination. The potential exists for a release of CWM and their breakdown products to the environment and/or exposure of on-site

personnel under this alternative. Appropriate health and safety techniques designed to minimize any potential contaminant release during excavation will be implemented under Alternative 3.

8.6 Criterion 6-Implementability

Another of the primary balancing criteria, Implementability, addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a specific solution.

The Army is able to implement any one of the three alternatives. Alternatives 1 and 2 could be implemented almost immediately. Alternative 3 is logistically and technically more difficult to implement than Alternatives 1 or 2, however, and will take approximately 1 month to implement the contract after the ROD is signed. Variations within the projected time frame for Alternative 3 could result based on the availability of personnel knowledgeable of CWM, the quantity and condition of the containers that may still contain CWM, the potential for discovery of cultural resources, and local weather conditions.

8.7 Criterion 7-Cost

The last primary balancing criterion, cost, considers estimated capital and operation and maintenance costs, as well as present worth costs.

Costs for the three alternatives were calculated for a 20-year duration for comparison purposes. Costs were projected, and actual costs may vary based on final design and detailed cost itemizations.

No known costs are associated with Alternative 1.

Alternative 2 would cost \$75,000 for capital construction and \$715,000 for operation and maintenance, for a total 20-year cost of approximately \$790,000. Although a monitoring costs are projected over 20 years, it is assumed that monitoring would continue indefinitely.

Alternative 3 will cost \$1 million for capital construction, but no costs are expected for operation and maintenance. The estimated total cost of Alternative 3 for the 20-year time frame is \$1 million.

8.8 Criterion 8-State Acceptance

The first of the modifying criteria, State Acceptance, considers whether the state will concur with, oppose, or have no comment on the selected IRA.

ADEC was involved in the preparation of the Proposed Plan and supports the selection of Alternative 3.

8.9 Criterion 9-Community Acceptance

The second of the modifying criteria, Community Acceptance, considers questions and comments received from the public during the 30-day comment period on the Proposed Plan.

Appendix A, the Responsiveness Summary, provides responses to all comments received during the comment period. Those who participated in the comment period did not voice the same concerns. As a result, the determination of community acceptance is based on an estimation of the overall acceptability of each alternative within the community.

Based on the comments received during the comment period, Alternative 1 is believed to be unacceptable to the community, Alternative 2 is believed to be unacceptable, and Alternative 3 is believed to be acceptable.

The community supports the Army, EPA and ADEC recommendation for Alternative 3 as the best alternative that most fully addresses all community concerns.

The main concerns voiced by those who provided comments during the public comment period addressed whether excavation is appropriate before an approved destruction method becomes available for CWM, costs associated with the removal, and safety issues. The secured storage area is more protective of human health and the environment than leaving potential CWM and their breakdown products buried at the current location. Excavation will take place under requirements specified in the work plan designed to protect public health during excavation activities. Costs associated with the removal of CWM are reasonable given the toxicity of the CWM, if present.

9.0 SELECTED REMEDY

The selected remedy is Alternative 3 because it best meets the nine CERCLA criteria. It protects human health and the environment and complies with ARARs. It is effective at reducing contamination both in the short term and long term, and is implement able, cost-effective, and acceptable to both the public and the State of Alaska. The other alternatives do not meet the criteria as well as Alternative 3. Alternatives 1 and 2 would provide little additional environmental benefit, especially relative to risk reduction. Alternative 3 is the most cost-effective of the three alternatives because it addresses, with certainty, the possible presence of CWM and prevents future releases.

The major components of the selected remedy include:

- Excavation of the Chemical Agent Dump Site to a maximum depth of approximately 15 feet or when bedrock is encountered;
- Field screening of excavated material for soil containing chemical agent breakdown products, debris, and glass vials or other containers that may still contain CWM;
- Storage of all excavated CWM in a secured IHF at Fort Wainwright until final disposition by treatment or disposal; and
- A chemical neutralization process and containerization of soil containing chemical agent breakdown products and debris for off-site disposal at an out-of-state, licensed disposal facility.

9.1 Rationale for Selection

The ability to achieve risk reduction was a major factor in making the selection of this IRA. Without excavation, there would be no means to determine whether CWM remain buried at the source area. Without this information, there could be no certainty that a release will not occur at this source area. Because there is no means to detect a release until it has occurred, and any exposure via the air or groundwater pathways by chemical agents is considered unacceptable, excavation of the source area is the most protective alternative. The selected remedy provides confirmation of the presence or absence of CWM and their breakdown products at the source area and provides a safe and secure holding facility for the CWM. There is a possibility that CWM will not be found at this source area, given the results of geophysical and sampling data. Adequate evidence exists to keep the source area in questionable status, however. As a result, long-term monitoring will be needed until the presence of CWM and their breakdown products is confirmed.

This alternative is also considered the most cost-effective in the long run. While the removal cost is slightly higher than the costs of the long-term groundwater monitoring alternative over a 20-year period, it is very unlikely that monitoring would cease after 20 years. In all probability, monitoring would continue indefinitely. Any CWM left in place could result in a release, and costs of cleanup at a future date would far exceed the costs encountered the selected alternative.

Excavation and storage eliminate the possibility for a release from this so source area to the groundwater at a future date. Any release could occur through container rupture or breakage caused by ground movement or physical disturbance.

9.2 The Interim Holding Facility

The Chemical Agent Dump Site is located within 1.25 miles of on-post Fairbanks residential areas, and the area is frequently used by nearby residents for recreational activities. In addition, the current source area has a chain-link fence around it; access is otherwise unrestricted.

The IHF is located in a secured area of Fort Wainwright, with restricted access and a controlled environment for storage of CWM. The facility was designed to prevent releases to the environment. Periodic external air sampling will be conducted by explosive ordnance disposal personnel to ensure that the containers are secure and that no release has occurred inside the holding cell.

The IHF is capable of containing any excavated CWM indefinitely. The intention, however, is to achieve ultimate disposal of the CWM as soon as possible. Final destruction of the CWM is not part of this ROD. Shipment of CWM and their breakdown products to off-site locations, either for holding or disposal, would comply with all applicable state and federal laws. The off-site rule (40 CFR 300.440) is applicable to off-site disposal if the CWM is determined to be a hazardous waste at time of disposal.

9.3 The Health and Safety Plan

The work plan for Alternative 3 includes measures necessary to ensure that no CWM are released to the air during excavation, neutralization, and transportation. A comprehensive health and safety plan has also been developed and will be approved by the Army Safety Office and other appropriate federal, state, and local agencies before conducting fieldwork at the source area. The health and safety plan addresses potential releases and threats to workers and nearby populations and emphasizes protection of human health and the environment.

Excavation at the source area will take approximately 2 weeks. The goal is to complete excavation before the fall session starts in the nearby elementary and junior high schools. Additional measures that will be implemented to protect workers and residents include:

- A fence will be placed beyond the perimeter of the source area to restrict road access during excavation;
- Air monitoring will be conducted continuously during excavation;
- Workers within the exclusion zone (area potentially affected by the removal action) will be shielded by protective equipment;
- Any soil with chemical agent breakdown products and debris will be immediately neutralized (with a decontamination agent or solution) and containerized; and
- If intact containers of CWM are found, they will be immediately placed in a decontamination solution and overpacked in state-of-the-art storage/transportation containers.
- To reconfirm that no metal objects (such as canisters) are left at the source area, metal detection equipment will be placed at a depth of approximately 4 feet during excavation.

10.0 STATUTORY DETERMINATIONS

The primary responsibility of the Army, EPA, and ADEC under their legal CERCLA authority is to select IRAs that are protective of human health and the environment. In addition, Section 121 of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, provides several statutory requirements and preferences. The selected remedy must be cost-effective and utilize permanent treatment technologies or resource recovery technologies to the extent practicable. The statute also contains a preference for remedies that permanently or significantly reduce the volume, toxicity, or mobility of hazardous substances through treatment. CERCLA finally requires that the selected remedial action for the source area must comply with ARARs established under federal and state environmental laws, unless a waiver is granted.

The selected alternative for this IRA is protective of human health and the environment and satisfies the requirements of Section 121 of CERCLA. It is anticipated that this action will be the final action required for removing CWM and their breakdown products from this source area unless groundwater contamination is identified, in which case the data will be immediately calculated and a response action taken. This remedy utilizes permanent solutions for potential soil contamination and alternate treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Storage of the CWM in a secured holding facility is the maximum practicable treatment available at this time.

10.1 Protection of Human Health and the Environment

The selected IRA will protect human health and the environment by excavating the source area, field screening of the excavated materials, neutralizing and containerizing soil containing chemical agent breakdown products and debris, and storing CWM in a Fort Wainwright IHF. Removal of CWM and their breakdown products will reduce the potential for release of contamination to the environment and subsequent migration of contaminants into groundwater. The selected remedy thus reduces the threat to future potential drinking water supplies.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements and To-Be-Considered Guidance

The selected remedy is expected to comply with all ARARs of federal and state environmental and public health laws. These include compliance with all the chemical-, action-, and location-specific ARARs listed below. No waiver of any ARAR is being sought or invoked for any component of the selected remedy. In addition, the selected remedy will comply with additional regulations that offer TBC guidance.

- Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) are established under the Safe Drinking Water Act (40 CFR 141). The monitoring results will be compared to MCLs to determine whether the standards have been exceeded. MCLs and MCLGs are relevant and appropriate.
- Alaska Water Quality Standards (18 AAC 70.020) protect groundwater from toxic and other deleterious effects of organic and inorganic substances. The standards are applicable if a release occurs to the groundwater.
- RCRA Subtitle C (40 CFR 261 [Code of Federal Regulations] Subpart D) is applicable in determining whether the CWM will be considered hazardous waste(s). The RCRA Off-Site Disposal Policy (40 CFR 300) is applicable to off-site disposal of RCRA-regulated waste.
- RCRA (40 CFR 264) Storage Requirements are applicable, but Army standards for storage of CWM are expected to be more restrictive.
- The Cleanup section of the State Oil and Hazardous Substances Pollution Control Regulations (18 Alaska Administrative Code [AAC] 75) requires that parties responsible for the discharge of any hazardous substance to land or water immediately contain, clean up, and dispose of the material collected. This state regulation will apply should any discharge occur.
- Section 404 of the Clean Water Act, which is implemented through regulations in the Federal Water Pollution Control Act (40 CFR 230), set forth guidelines to control discharges of dredged or fill material into wetlands. This action will be designed to ensure that there is no discharge of materials into wetlands adjacent to the source area.
- Army Regulation 50-6 Chemical Surety specifies handling and disposal requirements for nonstockpiled CWM. This regulation is appropriate to investigations and disposal of materials at this source area. This regulation also specifies air release modeling requirements and standards for the protection of public health.
- The source protection section of the State's Drinking Water Regulations (18 AAC 80.015) prohibits a person from creating or maintaining a condition that has a significant potential to pollute or contaminate a public water system. This regulation applies if a release occurs to the groundwater.

10.2.1 TBC Guidance

- Army Regulation 385-61, Army Toxic Chemical Agent Safety Program, outlines the procedures for transportation and handling requirements for CWM.
- Army Pamphlet 385-61, Toxic Chemical Agent Safety Standards, provides details and specific guidance for transporting and handling CWM.

10.3 Cost Effectiveness

The selected IRA is cost-effective because it protects human health and environment, attains ARARs, and meets the objectives established for the interim action in a way that is proportional to its cost. The cost of the selected remedy is slightly higher than the cost of Alternative 2. The Army, EPA, and ADEC do not believe that Alternative 2 is protective of human health and the environment; however, Alternative 1 is the least expensive but is not protective of human health and the environment.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

It is anticipated that this action will be the final action required for addressing this source area unless groundwater contamination is identified. If groundwater contamination is identified, data will be evaluated immediately and an appropriate response action will take place. This remedy utilizes permanent solutions for potential soil contamination and alternate treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatments that reduce toxicity, mobility, or volume as a principal element. Storage of the CWM in a secured holding facility is the maximum practicable treatment available at this time.

10.5 Preference for Treatment as a Principal Element

This action removes source(s) of contamination, if any, and limits the spread of contaminants to the

groundwater in the aquifer beneath the Chemical Agent Dump Site. By removing intact CWM to the IHF and by excavating and treating contaminated soils and debris, the selected remedies address the principle threats posed by the source area through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The selected IRA is the same as the preferred alternative presented in the Proposed Plan and during the public meeting. No changes in the components of the preferred alternative have been made.

APPENDIX A
RESPONSIVENESS SUMMARY
FOR THE RECORD OF DECISION FOR INTERIM REMEDIAL ACTION AT THE
CHEMICAL AGENT DUMP SITE, FORT WAINWRIGHT, ALASKA

A. OVERVIEW

The U.S. Army (Army), United States Environmental Protection Agency (EPA), and the Alaska Department of Environmental Conservation (ADEC), collectively referred to as the Agencies, distributed a Proposed Plan for interim remedial action (IRA) at the Chemical Agent Dump Site, a source area in Operable Unit 1 (OU-1), Fort Wainwright, Alaska. The Proposed Plan identified a preferred alternative that includes soil excavation, field screening, neutralization and containerization of soil containing chemical agent breakdown products and debris, and storage of chemical agent materials. The term chemical agent materials used in the Proposed Plan was substituted in the Record of Decision (ROD) and this Responsiveness Summary with chemical warfare materials (CWM). CWM consists of intact glass vials or other containers that may still contain chemical agents.

Specifically, the ROD describes the major components of the selected remedy as follows:

- Excavation of the Chemical Agent Dump Site to a maximum depth of approximately 15 feet, or when bedrock is encountered;
- Field screening of excavated material for soil containing chemical agent breakdown products, debris, and glass vials or other containers that may still contain CWM;
- Storage of all excavated chemical warfare materials in a secured interim holding facility at Fort Wainwright until final disposition by treatment or disposal; and
- A chemical neutralization process and containerization of soil containing chemical agent breakdown products and debris for off-site disposal at an out-of-state, licensed disposal facility.

The purpose of the IRA is to reduce risks posed by the potential presence of soil containing chemical agent breakdown products, debris, and CWM. The IRA will also reduce the potential for contamination of groundwater, thus eliminating a pathway of contaminant migration to humans, wildlife, and plants.

No comments regarding the Proposed Plan for the Chemical Agent Dump Site were received during the public comment period. However, questions asked at the public meeting on April 25, 1995, focused on rationale for excavation before final development and approved use of a mobile system to destroy or neutralize chemical agents. These questions and Agency responses are summarized in the following sections.

This Responsiveness Summary is organized into the following sections:

- Part B: Background of Community Involvement; and
- Part C: Summary of Questions Asked During the Public Meeting and Agency Responses.

B. BACKGROUND OF COMMUNITY INVOLVEMENT

Community relations activities, aimed at increasing public awareness and involvement, have been ongoing at Fort Wainwright for several years. In addition to a postwide Community Relations Plan, operable unit (OU)-specific community relations plans have been developed to address OU and source area concerns.

The public was encouraged to participate in the selection of the remedy for the Chemical Agent Dump Site during a public comment period from April 19 to May 19, 1995. The Fort Wainwright Proposed Plan for Interim Remedial Action at the Operable Unit 1 Chemical Agent Dump Site presented alternatives being considered by the Army, EPA, and ADEC for the source area. The Proposed Plan was released to the public on April 19, 1995, and copies were sent to all known and interested parties, including approximately 150 elected officials and concerned citizens. An informational Fact Sheet dated March 1995, providing information about the Army's entire cleanup program at Fort Wainwright, was mailed to the individuals and organizations on the mailing list.

The Proposed Plan summarized available information about the source area. Additional materials were placed in two information repositories located at the Noel Wien Library in Fairbanks and the Fort Wainwright Post Library. An Administrative Record, comprising all items placed in the information repositories and other documents used in the selection of the interim remedial action, was established in Building 3023 on Fort

Wainwright. Members of the public were invited to inspect materials available in the Administrative Record and the information repositories during business hours.

Interested citizens were invited to comment on the Proposed Plan and the remedy selection process in writing by mailing comments to the Fort Wainwright project manager, calling a toll-free telephone number to record a comment, or commenting in person at the public meeting on April 25, 1995, in Fairbanks at the Noel Wien Library.

Postwide community relations activities conducted for Fort Wainwright, which includes the Chemical Agent Dump Site as a source area in OU-1 have included:

- July 1992-Conducted community interviews with local officials and interested parties;
- April 1993-Prepared Community Relations Plan;
- July 1993-Distributed an informational fact sheet covering all Ous at Fort Wainwright;
- July 22, 1993-Conducted an informational public meeting covering all OUs;
- February 23, 1994-Established information repositories at the Noel Wien Library and the Fort Wainwright Post Library; and
- April 22, 1994-Established the Administrative Record at Building 3023 on Fort Wainwright.

Community relations activities specifically conducted for the Chemical Agent Dump Site included:

- April 12, 16, 19, 23, 24, and 25, 1995-Published display advertisement announcing the public meeting in the Fairbanks Daily News-Miner;
- April 19, 1995-Distributed Proposed Plan for Interim Remedial Action at the Operable Unit 1 Chemical Agent Dump Site;
- April 19 to May 19, 1995-30-day public comment period. No extension was requested;
- April 19 to May 19, 1995-Offered a toll-free telephone number for citizens to provide comment. The toll-free telephone number was advertised in the Proposed Plan and the newspaper display advertisement that announced the public meeting; and
- April 25, 1995-Conducted the public meeting at the Noel Wien Library to provide information, a forum for questions and answers, and an opportunity for public comment regarding the Chemical Agent Dump Site.

C. SUMMARY OF QUESTIONS ASKED DURING THE PUBLIC MEETING AND AGENCY RESPONSES

The public comment period on the Proposed Plan for Interim Remedial Action at the Operable Unit 1 Chemical Agent Dump Site was held from April 19 to May 19, 1995. No comments were received regarding the Chemical Agent Dump Site during the comment period. A public meeting was conducted on April 25, 1995, at the Noel Wien Library. The public meeting was divided into three parts: a presentation on the Chemical Agent Dump Site¹, an informal question-and-answer session, and a formal public comment session. The public was informed of the meeting structure at the beginning of the meeting.

Questions regarding the Chemical Agent Dump Site were raised during the meeting. Many of the questions were answered at the public meeting as reflected in the transcript filed in the Administrative Record. Two comments were received during the formal public comment period; however, they did not address the Chemical Agent Dump Site. Questions and Agency responses from the informal question-and-answer session are organized by relevant topics and summarized in the following section.

- 1 The public meeting referred to in this Responsiveness Summary was a joint meeting for IRA at the Chemical Agent Dump Site and Final Remedial Action at Operable Unit 3, Fort Wainwright, Alaska.

Presence of Contamination

1. Public Concern: A question was raised regarding why the Agencies plan to excavate soils if uncertainty exists regarding the presence of chemical warfare material at the site.

Agency Response: Every investigative technique has been used to determine the presence of soil containing chemical agent breakdown products, debris, and CWM at the site, except excavation. Based on the results of these investigations, it is not expected that metal containers are buried at the site. However, nonmetallic containers of CWM may be present at the site. It is also possible that nothing is buried at the site. The only way to determine whether CWM are buried at the site is to excavate soil at the site. Without knowing whether chemical warfare materials are buried at the site, the Agencies do not know whether or when potential soil or groundwater contamination could occur. Sort excavation would provide definite answers to these questions.

Destruction of Chemical Warfare Materials

1. Public Concern: A question was raised concerning the Army's plans to excavate the site before a method to destroy CWM is developed.

Agency Response: The Army is currently designing a mobile system to destroy or neutralize chemical warfare material. The system is scheduled to be field tested during August 1995. If field tests are successful, the system will be shipped to Alaska and used to neutralize any CWM excavated at the site.

2. Public Concern: A question was raised regarding the preferred alternative chosen by the Agencies because a method to destroy chemical warfare materials has not been approved for use. It was also questioned whether it would be safer to leave buried materials in place until a destruction method is developed.

Agency Response: The Army conducted an investigation, at the Chemical Agent Dump Site, which involved soil and groundwater sampling. Contamination was not detected. However, risk to possible future groundwater users may occur if CWM, potentially still present, leak into subsurface soil and migrate to groundwater. By excavating and removing soil containing chemical agent breakdown products, debris, and CWM, potential leakage of contaminants into subsurface soil and groundwater will no longer be possible.

3. Public Concern: Concern was expressed regarding the time frame between excavation and the destruction of CWM.

Agency Response: Excavation of the site is scheduled to begin within one month after the ROD is signed. Field tests for the mobile destruction system have not been completed; however, the Army expects the system to be available within the next year.

Cost Issue

1. Public Concern: The public questioned whether the \$1 million estimated to implement the preferred alternative included only excavation or all costs to clean up the site.

Agency Response: The \$1 million estimate includes development of the work plan and a health and safety plan, excavation of soils, neutralization of contaminated soil, and laboratory analysis of soil samples. The cost also includes storage of excavated CWM in a secured interim holding facility at Fort Wainwright.